**STATE OF MINNESOTA**
**ENVIRONMENTAL QUALITY BOARD**

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| In the Matter of the Application of Stoneray Power Partners, LLC for a Site Permit for a 105-Megawatt Large Wind Energy Conversion System in Pipestone and Murray County, Minnesota | **FINDINGS OF FACT, CONCLUSIONS AND ORDER ISSUING A SITE PERMIT TO STONERAY POWER PARTNERS, LLC**<br><br>**EQB DOCKET NO. 05-90-LWECS-STONERAY** |

The above-entitled matter came before the Minnesota Environmental Quality Board (MEQB), pursuant to an application by enXco, Inc., for a site permit to construct, operate, maintain and manage a 105-Megawatt (MW) nameplate capacity Large Wind Energy Conversion System (LWECS) and associated facilities on Buffalo Ridge in Pipestone and Murray counties. enXco applied for the permit on behalf of Stoneray Power Partners, LLC, a limited liability company. The permit is to be issued in the name of Stoneray Power Partners, LLC.

All of the proposed wind turbines, foundations, transformers, feeder lines and collection lines will be located in Pipestone and Murray Counties. Stoneray Power Partners, LLC will deliver power from this project to Xcel Energy. The energy from the proposed 105 MW project will be delivered to Xcel's Chanarambie substation located in section 6 of Chanarambie Township in Murray County, Minnesota.

## STATEMENT OF ISSUE

Should Stoneray Power Partners, LLC, be granted a site permit under Minnesota Statutes section 116C.694 to construct a 105-megawatt Large Wind Energy Conversion System in northeastern Pipestone County and northwestern Murray County?

Based upon the record and proceedings created in this proceeding, the Environmental Quality Board makes the following:

## FINDINGS OF FACT

### Background and Procedure

1. On February 1, 2005, enXco, Inc., (enXco), sole member and manager of Stoneray Power Partners, LLC (SPP), filed a complete application with the Minnesota Environmental Quality Board for up to 105 megawatts of nameplate

wind power generating capacity. (Exhibit 1). The delivered wind power generating capacity at the Chanarambie Substation will be approximately 100 megawatts.

2. EQB staff determined that the February 1, 2005, application complied with the application requirements of Minnesota Rules, part 4401.0450. In a memorandum to the EQB chair, dated February 16, 2005, EQB staff recommended that the EQB chair accept the application. (Exhibit 2).

3. On February 16, 2005, the EQB chair accepted the application and notified enXco, Inc. that its application for a site permit for the 105 megawatt Stoneray Wind Power Plant and associated facilities was accepted. (Exhibit 3).

4. On February 28, 2005, the EQB staff made available for public review and comment a draft site permit and distributed the draft site permit to EQB members, Pipestone and Murray County commissioners, township representatives, the landowners affected, and other interested persons on the EQB's wind power distribution list. (Exhibit 4). EQB staff scheduled a public meeting to be held in Lake Wilson, Minnesota, on March 15, 2005.

5. enXco's permit application was distributed to EQB members, the Public Utilities Commission, the Minnesota Historical Society, the office of the Southwest Regional Development Commission, the auditors of Pipestone and Murray counties, and township clerks. Each landowner affected by the proposed project also received a copy of the application, notice of application acceptance and public information meeting, and a copy of the draft site permit during the first week of March. (Exhibit 5)

6. The EQB published notice of the site permit application, EQB public information meeting and opportunity to comment on the draft site permit in the *Pipestone Star* on March 3, 2005 and the *Wheel-Herald* on March 7, 2005. (Exhibits 6 & 7). The published notice provided: a) location and date of the public information meeting; b) description of the proposed project; c) deadline for public comments on the application and draft site permit (April 1, 2005): d) description of the EQB site permit review process; and e) identification of the public advisor. The notice published meets the requirements of Minnesota Rules part 4401.0550 subp2.

8. On February 28, 2005, the EQB published in the *EQB Monitor* notice of the March 15, 2005, public information meeting in Lake Wilson, Minnesota, and the availability of the draft site permit, Volume 29, No. 5, February 28, 2005. (Exhibit 8) The published notice contained all of the information required by Minnesota Rules part 4401.0550 subp. 1. EQB staff also mailed a copy of this notice to all persons on the EQB's wind power distribution list. See Finding Number 5. Notice also appeared on the EQB web site.

9. The EQB held a public information meeting on March 15, 2005, in Lake Wilson, Minnesota, to receive comments on the site permit application and draft site permit. Approximately 65 people attended the meeting. Representatives from enXco, Inc., were also present. EQB staff responded to questions about the permitting process and enXco staff responded to questions about the project. Questions were asked about access roads, project timing, easement agreements and conditions, location of distribution and feeder lines, and project decommissioning. No significant issues or concerns were raised about the permitting process, the proposed project, or conditions in the draft site permit at the public meeting. The public comment period on the project closed on April 1, 2005.

**The Permittee**

10. enXco has formed a general-purpose limited liability company called Stoneray Power Partners, LLC, which will own and operate the Stoneray Wind Power Plant. Stoneray Power Partners is negotiating a power purchase agreement with Xcel Energy to supply electricity generated by the project. enXco is the General Manager of Stoneray Power Partners and is acting on behalf of the LLC during this permit proceeding. enXco currently owns 100% of the membership interest of Stoneray Power Partners.

**Project Description**

11. As proposed, the 105-megawatt Stoneray Power Project will consist of up to 70 General Electric Wind 1.5-megawatt wind turbine generators mounted on freestanding tubular towers. The proposed turbine model and specifications may change because the project will not be built until 2007.

12. The towers will be 65 to 80-meters (213 to 262 feet) in height. The blades on the wind turbine are 38.5-meters (126 feet) long. Turbine rotor diameter will be 77 meters (253 feet) across. The overall height of the tower, nacelle and blade will be approximately (103.5 to 118.5 meters) 340 to 389 feet when one blade is in the vertical position. The project will also include an underground-automated supervisory control and data acquisition system (SCADA) for communication purposes. Up to seven permanent meteorological towers will be used as part of the communication system. Other components of the project include a concrete and steel foundation for each tower, pad-mounted step-up transformers, all weather class 5 roads of gravel or similar material, and an underground and overhead electric energy collection system.

13. The GE Wind 1.5 MW wind turbine is a three blade, upwind, active yaw, and active aerodynamic control regulated wind turbine with power/torque control capabilities. The rotor utilizes blade pitch regulation and variable speed operation to achieve optimum power output at all wind speeds. The variable speed operation minimizes power and torque spike delivered from the rotor to the drive

train resulting in improved long-term reliability. Each turbine is equipped with a wind direction sensor. The wind direction sensor communicates with the computer system, which evaluates the measured wind parameters, and within a specified time interval, activates the yaw drives to align the nacelle to the wind direction.

14. Each turbine is interconnected through an underground electrical collection system at 34.5 kV. The 34.5 kV feeder lines from the project collection system feed the power to the independent breaker positions at the Chanarambie substation. The substation steps up the voltage from the 34.5 kV collection system to the transmission system level of 115 kV. The applicant is proposing to place the 34.5 kV feeder lines on public road rights-of-way where possible. Depending on conditions the feeder lines may be either overhead or underground. All of the proposed feeder lines would connect to the Chanarambie Substation.

15. The blades are made of fiberglass with a smooth layer of gel coat that provides ultraviolet protection. The blades will be either white or grey in color. The blades will be equipped with lightning protection. The entire turbine is also grounded and shielded to protect against lightning.

16. Each tower will be secured by a concrete foundation that will vary in size depending on the soil conditions. A control panel that houses communication and electronic circuitry is placed in each tower. In addition, a step-up, pad-mounted transformer is necessary for each turbine to collect the power from the turbine and transfer it to a 34.5 kV collection system via underground cables.

17. All turbines and a meteorological tower system will be interconnected with fiber optic communication cable that will be installed underground. The communication cables will run back to a central host computer which will be located either at the Chanarambie substation or at the operations and maintenance facility where a supervisory control and data acquisition (SCADA) system will be located. Signals from the current and potential transformers at each of the delivery points will also be fed to the central SCADA host computer. The SCADA system will be able to give status indications of the individual wind turbines and the substation and allow for remote control of the wind turbines locally or from a remote computer in California. This computerized supervisory control and data acquisition network will provide detailed operating and performance information for each wind turbine. enXco, Inc., will maintain a computer program and database for tracking each wind turbine's maintenance history and energy production. The EQB will have access to the SCADA system.

18. Housed inside the fiberglass nacelle that sits on the top of the tower are the generator, brake system, yaw drive system and other miscellaneous components.

**Wind Resource Considerations**

19. The Stoneray Wind Power Project will be located along Buffalo Ridge in Pipestone and Murray Counties. Buffalo Ridge rises about 200 feet above the surrounding terrain with a general orientation northwest to southeast. Winds perpendicular to the ridge are topographically accelerated as they flow over the ridge. Land use in the Buffalo Ridge area is agricultural with intensive farming and grazing activities and, as a result, there are few trees or structures in the proposed project site to inhibit the wind as it passes over the ridge. The wind resource in the Buffalo Ridge area is well documented by the Wind Resource Analysis Program (WRAP) Report (2002) prepared by the Minnesota Department of Commerce. The WRAP Report presents wind analysis data from monitoring stations across the state of Minnesota.

20. For this project the wind turbines will be sited in clusters or strings along hilltops and ridgelines within the site boundaries. The wind turbines are sited so as to have good exposure to winds from all directions with emphasis on exposure to the prevailing southerly wind direction. The turbine spacing, according to Stoneray Power Partner's application, maximizes use of the available wind and minimizes wake and array losses within the topographical context of the site. The turbine strings are typically oriented west-northwest to east-southeast, which is roughly perpendicular to the prevailing southerly winds. Turbine placement has been designed to provide 4 to 5 rotor diameter spacing in the east-west direction and 7 to 8 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing is widest in the north-south direction. Greater or lesser spacing between the turbine strings may be used in areas where the terrain dictates the spacing. This is addressed in the permit at III.E.5. Individual, isolated turbine sites are avoided to minimize interconnection and access costs. Sufficient spacing between the turbines is utilized to minimize wake losses when the winds are blowing parallel to the turbine rows.

21. The gross annual energy output per turbine is estimated to be approximately 6,314-megawatt hours (MWh). Assuming an efficiency of 85.03 percent when the wind is blowing, the net annual energy output per turbine is expected to be 5,500 MWh. If 70 turbines are used, the project will produce approximately 385,000 MWh per year. The base energy calculation presented assumes a normal or average wind year. The maximum variation in energy is within +/- 15 percent. Based on the data, one would expect the annual variation in energy at the project site to be within 10 percent of the mean during most years.

22. Most of the land within the project site is actively farmed. Approximately 92 percent of the land in Pipestone and Murray counties is used for agricultural purposes. Corn and soybeans are the dominant crops. Alfalfa, small grains and pasture are additional crops within the area.

23. The project site as proposed included approximately 15,440 acres. On March 11, 2005, enXco reduced the proposed project site by approximately 480 acres. (Exhibit 9) The proposed site now includes approximately 14,960 acres of land in the townships of Rock and Burke in Pipestone County and the townships of Cameron and Chanarambie in Murray County. The land is predominately agricultural, with some scattered wooded areas, and wetlands. The proposed wind turbine site layout in the site permit application shows where the proposed facilities, such as towers, roads and the underground electrical lines, could be located. These locations are very preliminary and subject to change. It is estimated that the proposed facilities will result in the permanent disturbance of approximately 32 acres of land, primarily for roads and towers. Approximately 198.93 acres of land will be temporarily disturbed during construction of the wind farm for contractor staging areas, foundation construction, underground power lines, and tower and turbine assembly. Roads are expected to be about 16 feet wide.

**Land Rights and Easement Agreements**

24. In order to build a wind plant, a developer needs to secure site leases and easement option agreements to ensure access to the site for construction and operation of a proposed project. These lease or easement agreements also prohibit landowners from any activities that might interfere with the execution of the proposed project.

25. enXco has obtained lease and easement option agreements and/or rights to such agreements with landowners for land within the project site boundary necessary for installation of the components of the wind farm. These rights and easements will be available to Stoneray Power Partners for this project.

**Written Comments and Letters Received by April 1, 2005**

26. By the close of the comment period on April 1, 2005, the EQB had received two comment letters on the proposed Stoneray project.

27. The first letter was from the Minnesota Department of Natural Resources, dated March 30, 2005. (Exhibit 10) The DNR offered several comments in their letter. DNR suggested a language change in the site permit (III.C.3 Setbacks-Roads) that includes a 250-foot setback for wind turbines from the Casey Jones State Trail right-of-way, similar to the setback for public roads. This setback requirement is incorporated into the site permit (III.C.3.).

28. The DNR suggested the applicant should survey for the presence of Blanding's turtle in wetlands and state-listed bird species nesting in the project vicinity. The Site Permit requires a biological preservation survey at (III. D. 1.), including a survey for Blanding's turtles and state listed bird species as DNR requested.

29. The applicant is aware of these DNR comments and will coordinate any setback requirements from state-listed bird species nesting in the project vicinity at the appropriate time.

30. DNR also commented about the presence of the Topeka Shiner, a federally endangered species, and the Plains Topminnow (*Fundulus sciadicuss),* in the portion of the East Branch of the Rock River and its tributaries and the North Branch Chanarambie Creek that flow through the project site. Within the project site the Rock River and North Branch Chanarambie Creek have been designated as critical habitat for both species. DNR best management practices will be used for any construction in the vicinity of the East Branch of the Rock River and its tributaries and the North Branch Chanarambie Creek. These practices are referenced in the site permit as (III. M Special Conditions) and as Exhibit 3 of the Site Permit.

31. Other topics DNR commented on are the presence of the Blanding's Turtles, a state threatened species in the southeast portion of the project site, and native prairie. The applicant is aware of the Blanding's Turtles and its habitat in the southeast portion of the site and will work with the DNR to implement procedures to protect the Blanding's Turtles and its habitat. The site permit at condition III.C.6. addresses native prairie and requires a management plan if prairie is present within the development site.

32. The second letter, dated March 31, 2005, was from Tim Seck representing PPM Energy. (Exhibit 11) PPM owns the existing 51 megawatt Moraine LWECS which is immediately adjacent to the proposed Stoneray Wind power Plant and the existing Chanarambie LWECS owed by enXco. PPM indicated the company's desire to be notified of "any requests by the Stoneray Wind Project for a variance(s) from the MEQB wind siting rules or established practices."

**Site Criteria**

33. Minnesota Rules chapter 4401 applies to the siting of Large Wind Energy Conversion Systems. The rules require applicants to provide a substantial amount of information to allow the EQB to determine the potential environmental and human impacts of the proposed project and whether the project is compatible with environmental preservation, sustainable development, and the efficient use of resources. Minn. Rules parts 4401.0450 through 4401.0600. The following analysis addresses the relevant criteria that are to be applied to a LWECS project.

**Human Settlement, Public Health and Safety**

34. The site is in an area of low population density, with little residential, commercial or industrial development on or near the site. As a result, the impact of the proposed LWECS on human settlement, public health and safety will be minimal.

The site permit, at part III. C., has conditions for setbacks from residences and roads. The proposed wind turbine layout meets or exceeds those requirements. The proposed project is not expected to affect any water wells (used, unused or unsealed) or any rural water system that services the area.

35. There will be no displacement of existing residences or structures in siting the wind turbines and related facilities.

36. The project will comply with the Federal Aviation Administration requirements with respect to lighting. See site permit condition III.E.4.

37. Stoneray Power Partners will provide security during construction and operation of the project, including fencing, warning signs, and locks on equipment and facilities. Stoneray Power Partners will also provide landowners and interested persons with safety information about the project and its facilities. See site permit condition III.B.15.

38. In winter months ice may accumulate on the wind turbine blades when the turbines are stopped or operating very slowly. Furthermore, the anemometer may ice up at the same time, causing the turbine to shut down during any icing event. As weather conditions change, any ice will normally drop off the blades in relatively small pieces before the turbines resume operation. This is due to flexing of the blades and the blades' smooth surface. Although turbine icing is an infrequent event, it remains important that the turbines are not sited in areas where regular human activity is expected below the turbines or in the immediate proximity during the winter months.

39. Each turbine will be clearly labeled to identify each unit and a map of the site with the labeling system will be provided to local authorities as part of the fire protection plan.

**Noise**

40. Wind turbines do generate noise. GE Wind and noise consultants suggest a maximum noise threshold of 45 dBA at occupied homes. According to sound pressure level tests and estimations provided by Stoneray Power Partners in its application for a site permit, the sound pressure level is expected to be lower than the Pollution Control Agency noise standard of 50 dBA measured at the closest residence. See Minn. Rules part 7030.0040. For this project, the site permit application indicates that at a distance of 1,000 feet from the turbines, the noise measured at a home will be less that 45 dBA. According to Figure 14 of the application, at a distance of approximately 500 feet, the noise level will be 45 dBA.

**Visual Values**

41. The placement of up to 70 turbines will affect the appearance of the area. The wind turbines will be mounted on tubular towers that are up to 265 feet tall. The rotor blades will have a diameter of up to 254 feet. The turbine towers and rotor blades will be prominent features on the landscape. There will be intermittent, expansive views of the turbines to passing motorists on state highways 30 and 91. Motorists and drivers on local township and county roads will travel within 300 feet of some turbines.

42. The visual impact of the wind turbines will be reduced by the use of a neutral paint color. The only lights will be those required by the Federal Aviation Administration. All site permits issued by the EQB require the use of tubular towers; therefore, the turbine towers will be uniform in appearance. These wind turbines will be the dominant visual features on the ridge. The turbine towers will be similar to those used on the Chanarambie and Moraine wind projects adjacent to this proposed project. Blades used in the proposed project will be white. The wind turbines in this project, while prominent on the landscape, also blend in with the surrounding area. The project site will retain its rural character. The turbines and associated facilities necessary to harvest the wind for energy are consistent with existing land use and agricultural practices.

43. From one perspective, the proposed project might be perceived as a visual intrusion on the natural aesthetic value on the landscape, characterized by up to 70 tubular steel structures approximately 265 -feet high, standing on formerly undisturbed ridgelines, with 126 -foot blades, for an overall height of 389 feet when one blade is in the vertical position. Wind plants have their own aesthetic quality, distinguishing them from other non-agricultural uses. In the last several years most of the overhead electric distribution lines and telephone lines in northwestern Murray County have been placed underground, which does open up the view shed for people traveling through the area. The existing wind plants have altered the landscape in the area from agricultural to wind plant/agricultural. This project will add to visual impact of the area. The cumulative effect of the proposed project will increase both the industrial appearances of the wind plants on Buffalo Ridge and the areas from which they will be seen. Because wind generation development is likely to continue on the ridge, this visual impact will continue to increase the size of the wind plant/farm footprint as the turbines harvest the wind resources of Buffalo Ridge for energy. To date the presence of the wind turbines on Buffalo Ridge has been well accepted by the people who live and work in the area.

44. Several other measures will also be taken to minimize visual intrusion such as: low profile access roads, project access roads will avoid cuts and fill, the areas affected by construction will be restored after construction is completed, turbines will not be illuminated unless required by FAA regulations, and the turbine rotor size will require increased turbine spacing to minimize wake loss, therefore the

turbines will be spaced further from one another than in other projects on Buffalo Ridge. The visual scale will be similar.

**Recreational Resources**

45. Recreational opportunities in Pipestone Murray County include hunting, fishing, and snowmobiling, camping, and hiking. Hunting is permitted in designated state Minnesota Department of Natural Resources wildlife management areas (WMA's), unless otherwise posted.

46. There are four WMA's within one mile of the project site. WMA's are managed to provide wildlife habitat, improve wildlife production and provide public hunting and trapping opportunities. These MDNR lands were acquired and developed primarily with hunting license fees. WMA's are closed to all-terrain vehicles and horses because of detrimental effects on wildlife habitat. An undeveloped portion of the Casey Jones State Trail is located within the project site near the City of Woodstock in Pipestone County.

47. The turbines will be noticeable to persons using the WMA's and the Casey Jones State Trail. Turbines will not be located in WMA's or in any local parks. Turbine operations are not expected to affect the natural areas in any material way and no adverse impact on wildlife management areas or practices is expected. The turbines will be set back 250 feet from the Casey Jones Trail.

**Infrastructure**

48. The proposed wind farm is expected to have a minimal effect on the existing infrastructure. The proposed project will use underground cables for the collector lines on private property within the wind farm. The feeder lines associated with the project are currently planned to be underground. Any aboveground feeder lines, if used, would be wood-pole, 34.5 kV typical of wind project feeder lines in the area that tie into the Chanarambie Substation. The feeder lines will deliver the energy from the wind farm to the Chanarambie Substation. Placement of collector and feeder lines is addressed in the site permit at III.E.7. and 8.

49. The project will require the use of public roads to deliver construction supplies and materials to the work site. Site permit condition III.B.8. addresses this topic. Construction of the project requires the addition of several miles of access roads that will be located on private property. The access roads will be routed along the wind turbine strings, fence lines, and field edges to minimize disturbance to agricultural activities. The typical access road will be 15 to 20 feet in width and covered in Class 5 gravel (or similar material). The access roads will be low profile roads to allow for the movement of agricultural equipment. The site permit at III.B. 8 (b) addresses this topic. During operation and maintenance of the wind plant, operation and maintenance crews, while inspecting and servicing the wind turbines, will use access roads. Periodic grading or other methods will

maintain the roads necessary to maintain road integrity. The Permittee may do this work or contract it out.

50. If access roads must be installed across streams or drainage ways, the Permittee in consultation with the Minnesota Department of Natural Resources will design, shape and locate the road so as not to alter the original water flow or drainage patterns. Any work required below the ordinary high water line, such as road crossings or culvert installation, will require a permit from the Minnesota Department of Natural Resources.

51. The proposed wind farm will not affect water supplies, railroads, telecommunication facilities, and radio reception. The presence or operation of the wind plant could potentially impact the quality of television reception in the area. Previous work on television reception issues indicates that in some cases new antennas or relocation of existing antennas can restore television signal strength reception. Stoneray Power Partners will address the concerns of residents in the area of the project site before and after the project construction to document and mitigate any television reception impacts that might occur. This is addressed in the site permit at III.D.3.

52. Construction, operation, and maintenance of the proposed wind plant will comply with all of the required federal and state permit requirements.

**Community Benefits**

53. The project will provide local tax revenues from a production tax on the wind turbines. No significant adverse impact on public services is expected. Wear and tear on roads will occur as a result of the transport of heavy equipment and other materials. The site permit at III.B.8. addresses road damages. Landowners with turbine(s) on their property will also receive payments from the Permittee for energy generated by the turbine(s).

54. To the extent that local workers and local contractors are capable, qualified, and available, Stoneray Power Partners will seek to hire them to construct the proposed project. The hiring of local people will expand employment opportunities in this area of the state and keep money in the local economy. Once constructed, the project will be staffed with five to six full time site technicians and a wind plant supervisor.

**Effects on Land-Based Economies**

55. The wind turbines and access roads will be located so that the most productive farmland will be left as intact as possible. However, the project will displace approximately thirty two acres of agricultural land. The site permit at III.B. 2., 3., 4., 5., 6., 7., 8(c)., 9., and 10. addresses mitigation measures for agricultural lands. The proposed project does not affect any sand or gravel operations.

## Archaeological and Historical Resources

56. A review of the Minnesota State Historic Preservation Office (SHPO) computer database indicates that no recorded archaeological sites are within the project site, although six are within one-mile of the site. The project area is located in rough proximity to lithic scatters and artifacts. The geographical prominence of Buffalo Ridge made it a significant location for Native Americans, especially the Dakota Indians.

57. A Phase I Archaeology survey is recommended for all the proposed turbine locations, access roads, junction boxes and areas of construction impact for the transmission line to document any previously unrecorded archaeological sites within the project site. The site permit at III. D.2. requires Stoneray to conduct an archaeological reconnaissance survey. A Phase I archaeology survey consists of the following tasks: consultation, documentation, and identification.

58. If any archaeological sites are found during the Phase I survey, their integrity and significance should be addressed in terms of the site's potential eligibility for placement on the National Register of Historic Places (NRHP). If such sites are found to be eligible for the NRHP, appropriate mitigative measures will need to be developed in consultation with the Minnesota State Historic Preservation Officer (SHPO), the State Archaeologist, and consulting American Indian communities. The site permit also requires the Permittee to stop work and notify the Minnesota Historical Society and EQB if any unrecorded cultural resources are found during construction.

## Air and Water Emissions

59. No harmful air or water emissions are expected from the construction and operation of the LWECS.

## Animals and Wildlife

60. Neither construction nor operation of the project is expected to impact wildlife. Based on studies of existing wind power projects in the United States and Europe, the only impact of concern to wildlife would primarily be to avian and bat populations. The final report on avian monitoring studies at Buffalo Ridge, Minnesota "Final Report-Avian Monitoring Studies at the Buffalo Ridge, Minnesota Resource Area: Results of a 4-Year Study" (September 2000) identified the following impacts:

    a) Following construction of the wind turbines, there is a reduction in the use of the area within 100 meters of the turbines by seven of 22 species of grassland breeding birds. It was hypothesized that lower avian use may be

associated with avoidance of turbine noise, maintenance activities, and less available habitat. The researchers stated "on a large scale basis, reduced use by birds associated with wind power development appears to be relatively minor and would not likely have any population consequences on a regional level."(p. 44)

b) Avian mortality appears to be low on Buffalo Ridge, compared to other wind facilities in the United States, and is primarily related to nocturnal migrants. Resident bird mortality is very low and involves common species. The researchers stated that "based on the estimated number of birds that migrate through Buffalo Ridge each year, the number of wind plant related avian fatalities at Buffalo Ridge is likely inconsequential from a population standpoint." (p. iv)

61. Bat mortality was also studied at Buffalo Ridge, instigated by bat collision victims found during the avian monitoring studies. The bat study was conducted in 2001 and 2002. ("Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area," November 2003). The overall conclusion is that bat activity at turbines and the numbers of bat fatalities do not share a statistical relationship. Bat collisions were found to be very rare, given the amount of bat activity documented at the turbines. Most fatalities involved migrating bats, a wind-plant related mortality "is possibly not sufficient to cause significant, large-scale population declines." (p. 61)

62. Mitigation measures are also prescribed in the site permit and include but are not limited to: a) a pre-construction inventory of existing biological resources, native prairie, state listed and threatened species and wetlands in the project area; b) turbines and associated facilities will not be constructed in wildlife management areas, recreation and state and scientific natural areas; c) trees and shrubs that are important to the wildlife present in the area will not be disturbed; d) sound water and soil conservation practices will be implemented during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion will be taken. This also applies to any work in proximity to watercourses.

63. DNR in its comment letter dated March 30, 2005, commented that the federally-endangered and state special concern Topeka shiner (*Entropies topeka*) is known to occur in the project area, and the Site Permit includes Best Management Practices to protect shiner habitat. See Exhibit 3 in the site permit.

**Vegetation**

64. No public waters, wetlands or forested land are expected to be affected by the project. No groves of trees or shelterbelts will need to be removed to construct and operate the system. Native prairie will also be avoided. If native prairie

cannot be avoided, the site permit, at III. C.6. provides for preparation of a prairie protection and management plan.

**Soils**

65. Construction of the wind turbines and access roads increases the potential for erosion during construction and converts prime farmland to industrial use. The site permit at III. B. 9. requires a soil erosion and sediment control plan. The project will also require a storm water run-off permit from the Minnesota Pollution Control Agency.

**Surface Water and Wetlands**

66. No towers, access roads or utility lines will be located in surface water or wetlands. See site permit at III.C.5.

**Future Development and Expansion**

67. Other wind projects have been installed throughout Buffalo Ridge, north and south of the Lake Wilson, Woodstock and Chandler areas. Current information suggests the Ridge's windy areas are large enough to accommodate more wind facilities. In the future, turbines used at the Ridge likely will consist of several types and sizes supplied by different vendors and installed at different times.

68. While large-scale projects have occurred elsewhere (California), little systematic study of the cumulative impact has occurred. Research on the total impact of many different projects in one area has not occurred. EQB will continue to monitor for impacts related to wind energy development.

69. The EQB anticipates more site permit applications under Minnesota Statutes section 116C.694 (a). The EQB is responsible for siting of LWECS "in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources." Minnesota Statutes section 116C.693.

70. Minnesota Statutes section 116C.57, subd. 4 requires consideration of design options that might minimize adverse environmental impacts. By using larger turbines, fewer turbines are required, reducing siting needs for turbines and related facilities. Turbines must also be designed to minimize noise and aesthetic impacts. Buffers between strings of turbines are designed to protect the turbines' production potential. The site permit also provides for buffers between adjacent wind generation projects to protect production potential. See site permit at III.C.1.

71. The location and spacing of the turbines are critical to the issues of orderly development and the efficient use of wind resources. Turbines are likely to be

located in the best winds, and the spacing dictates, among other factors, how much land area the project occupies. There is strong public support for orderly development.

72. One efficiency issue is the loss of wind in the wake of turbines. When wind is converted to rotational energy by the blades of a wind turbine, energy is extracted from the wind. Consequently, the wind flow behind the turbine is not as fast and is more turbulent than the free-flowing wind. This condition persists for some distance behind the turbine as normal wind flow is gradually restored. If a turbine is spaced too close downwind of another, it produces less energy and is less cost-effective. This is the wake loss effect. If the spacing is too far, wind resources are wasted and the projects' footprint on the land is unnecessarily large.

73. For this project, turbine spacing maximizes use of the available wind resources and minimizes wake and array losses within the topographical context of the site. Site topography and wind resources did not lead to a layout involving long strips of turbines running parallel to each other and perpendicular to the prevailing wind. Instead, the site uses shorter strings. The objective was to capture the most net energy possible from the best available wind resource. Allowing for setback from roads and residences and avoiding native prairie and other sensitive areas, Stoneray Power Partners arrived at an average turbine spacing of about 4 to 5 rotor diameter spacing in the east-west direction and 7 to 8 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing between turbines is greatest in the north-south direction for projects on Buffalo Ridge. enXco's wake investigation shows that the estimated array losses for the proposed Stoneray project will be around 6.47 percent.

74. Other factors that lead to discounts were assumed to be identical for all arrays and include turbine availability (2 %); blade soiling (1%), icing (1%), high wind hysteresis (0.20), cold weather shutdown (1.40 %), electrical efficiency (2%), parasitic 0.90 %). Total losses are calculated at 14.97 percent.

**Maintenance**

75. Maintenance of the turbines will be on a scheduled, rotating basis with one or two units normally off for maintenance each day, if necessary. Maintenance on the interconnection points will be scheduled for low wind periods and coordinated with Xcel Energy. The Stoneray Wind Power Plant will be staffed with five to six full time site technicians and a wind plant supervisor.

**Decommissioning and Restoration**

76. The estimated decommissioning cost for the Stoneray Wind Power Plant is one million dollars. Decommissioning activities will include (1) removal of all turbines and towers; (2) removal of all pad mounted transformers; (3) removal of

all above-ground distribution facilities; (4) removal of foundations to a depth of three feet below grade; and (5) removal of surface road material and restoration of the roads and turbine sites to previous conditions to the extent feasible. The Permit requires the Permittee to submit a Decommissioning Plan to the EQB that describes how the Permittee will ensure that the resources are available to pay for decommissioning the project at the appropriate time. Decommissioning funds will be set aside as specific budget item. A set-aside guarantee will be executed on behalf of the project owner with an independent administrator for the funds. The independent administrator will report annually to the project owner on the status of decommissioning funds. The project owner will report every eight years to the independent administrator with an updated budget for the cost of decommissioning the plant in current-year and decommissioning-year dollars. See Exhibit 1, page 30.

**Site Permit Conditions**

77. Nearly all of the conditions contained in this site permit were established as part of the site permit proceedings of other wind turbine projects permitted by the EQB. No significant comments were received concerning the requirements in the draft site permit distributed for comment on February 28, 2005. Minor changes that provide for clarifications of the draft site permit conditions have been made.

78. The site permit contains conditions that apply to site preparation, construction, cleanup, restoration, operation, maintenance, abandonment, decommissioning and all other aspects of the project.

**Other**

79. A portion of the land area in this site permit application is already covered by a permit from the EQB for an LWECS. On December 19, 2002, the EQB issued a site permit to Stoneray Power Partners, LLC for a 24-megawatt LWECS (EQB Docket # 02-45-LWECS-ENXCO). The power from that project was to be delivered to Great River Energy. However, GRE elected not to pursue the original 24-megawatt Stoneray Power Partners, LLC, and replaced it with the EQB permitted Trimont Wind, LLC project, a 100 megawatt LWECS project that will be built in Jackson and Martin Counties in 2005.

80. In an April 11, 2005, letter to Chairman Schroeder, Joseph Fahrendorf, Vice President of Business Development for enXco, stated that: "upon the issuance of a permit for the LWECS under review in docket number 05-90-LWECS-Stoneray, the original Stoneray Site Permit, (Docket Number 02-45-LWECS-ENXCO) will become redundant." Mr. Fahrendorf on behalf of enXco stated that the: "Applicant agrees that when a new Stoneray permit is issued, the Stoneray Site permit docket number 02-45-LWECS-ENXCO can be allowed to expire or considered terminated at the EQB's discretion." (Exhibit 12)

Based on the foregoing findings, the Minnesota Environmental Quality Board makes the following:

## CONCLUSIONS OF LAW

1. Any of the foregoing findings, which more properly should be designated as conclusions, are hereby adopted as such.

2. The Minnesota Environmental Quality Board has jurisdiction under Minnesota Statutes section 116C.694 over the site permit applied for by Stoneray Power Partners, LLC.

3. The Stoneray Power Partners, LLC application for a site permit was properly filed and noticed as required by Minnesota Statutes section 116C.94 and Minnesota Rules parts 4410.0460 subp 2 and 4401.0550 subp 2.

4. The Minnesota Environmental Quality Board has afforded all interested persons an opportunity to participate in the development of the site permit and has complied with all applicable procedural requirements of Minnesota Statutes section 116C.694 and Minnesota Rules Chapter 4401.

5. No objections were filed with the Minnesota Environmental Quality Board by any governmental unit, affected landowner or any other interested person during the 30-day comment period and no public hearing was requested or is required.

6. The Minnesota Environmental Quality Board is the agency directed to carry out the legislative mandate to site LWECS in an orderly manner compatible with environmental preservation, sustainable development and the efficient use of resources. The proposed Stoneray Power Partners, LLC 105-megawatt LWECS project will not create significant human or environmental impacts and is compatible with environmental preservation, sustainable development, and the efficient use of resources.

7. The Minnesota Environmental Quality Board has the authority under Minnesota Statutes section 116C.694 to establish conditions in site permits relating to site layout and construction and operation and maintenance of an LWECS. The conditions contained in the site permit issued to Stoneray Power Partners, LLC are appropriate and necessary and within the Minnesota Environmental Quality Board's authority.

8. The site permit issued to enXco on December 19, 2002, Site Permit No. 02-45-LWECS-ENXCO can be revoked at the request of the permittee.

Based on the foregoing Findings of Fact and Conclusions of Law, the Minnesota Environmental Quality Board issues the following:

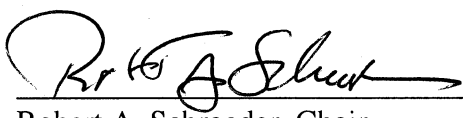
## ORDER

The Environmental Quality Board hereby issues a site permit to Stoneray Power Partners, LLC in the form attached hereto. The site permit authorizes Stoneray Power Partners, LLC to construct and operate a 105-megawatt large wind energy conversion system in the counties of Pipestone and Murray in accordance with the conditions contained in the site permit for EQB Docket No. 05-90-LWECS-STONERAY.

It is further ordered that the first Stoneray Site Permit (EQB Docket No. 02-45-LWECS-ENXCO) be terminated.

Approved and adopted this 16th day of June 2005

STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD



Robert A. Schroeder, Chair